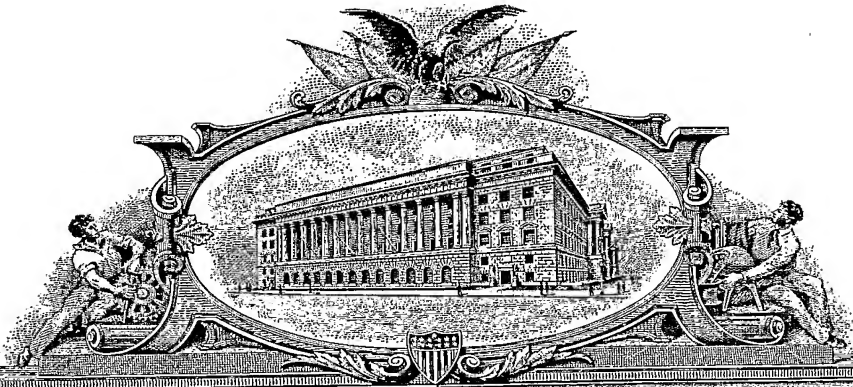


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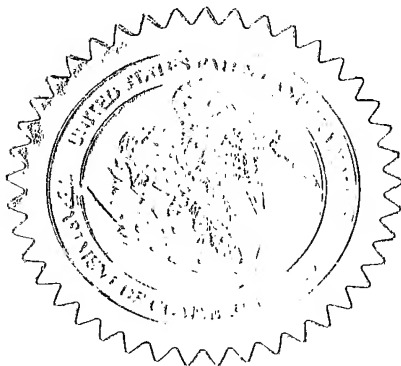
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**APPLICATION NUMBER: 60/448,136**

**FILING DATE: February 20, 2003**

**RELATED PCT APPLICATION NUMBER: PCT/US04/04793**

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# PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No.

## INVENTOR(S)

Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
William O.	Walters	Seattle, Wa

☐ Additional inventors are being named on the \_\_\_\_\_ separately numbered sheets attached hereto

## TITLE OF THE INVENTION (500 characters max)

Hopper For Loading Foam Pellets

Direct all correspondence to:

## CORRESPONDENCE ADDRESS

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## ENCLOSED APPLICATION PARTS (check all that apply)

☒ Specification Number of Pages

☐ CD(s) Number

☒ Drawing(s) Number of Sheets

☐ Other (specify)

☐ Application Data Sheet, See 37 CFR 1.76

## METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT

☒ Applicant claims small entity status. See 37 CFR 1.27.

☐ A check or money order is enclosed to cover the filing fees.

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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

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☐ Yes, the name of the U.S. Government agency and the Government contract number are:

Respectfully submitted,

SIGNATURE

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312-857-1999

Date: 02/19/03

REGISTRATION NO.

(if appropriate)

Docket Number:

34,809

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This collection of information is required by 37 CFR 1.51. The information is used by the public to file (and by the PTO to process) a provisional application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the complete provisional application to the PTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Box Provisional Application, Assistant Commissioner for Patents, Washington, D.C. 20231.

## **HOPPER FOR LOADING FOAM PELLETS**

### **CROSS REFERENCE TO RELATED APPLICATIONS**

#### **FIELD OF THE INVENTION**

This invention relates to an apparatus for the cleaning of tubes. More particularly, to an attachment used to rapidly load pellet launchers. Thereby reducing the cost and providing a savings from loss of down time and cost of recovery.

#### **BACKGROUND OF THE INVENTION**

Industry has been looking for ways to clean hydraulic tubing that can replace the current method of vapor degreasing. A vapor degreaser is a large organic solvent still in which the solvent vapor condenses on and drains off the parts to be cleaned. Vapor degreaser systems are large, fixed installations which have a high purchase price and maintenance costs. Companies which use this method must also must obtain a yearly operating permit for there facilities from the Clean Air Agencies because of its potential air pollution and health risks. Replacing these vapor degreasers with a small, low-cost cleaning methods allow installations to consolidate sites and save money.

The pellet system is currently used to clean tubes at a relatively high rate in close quartered work cells. Tubes are bent into a large variety of complicated shapes and lengths. Pellets must be loaded, launched/retrieved and examined with a minimum of operator movement. Equipment which requires the operator to find and fetch the spent pellet lowers productivity. Safety and noise consideration require that the pellets be fired into a containment device and that the noise be reduced to acceptable levels.

One method is to propel a polyurethane foam pellet through the tube using compressed air. The tight-fitting foam scrubs the interior wall of the tube as it passes through. This is a widely used technique and there are at least 3 makers of pellets and pellet launching equipment worldwide. One component lacking from the vendors is equipment to capture and return the spent pellet to the operator so that it may be examined.

This invention provides an innovative, unique and useful attachment to commercially available pellet launchers for tube cleaning. This attachment speeds up the process for retrieval and provides productivity improvements because the pellet method allows the user to go from the current batch-processing method to one-piece processing in work cells.

### **SUMMARY OF THE INVENTION**

The present invention provides an innovative, unique and useful cartridge or hopper for available foam pellet launchers for tube cleaning. This attachment speeds up the process and provides productivity improvements because the pellet method allows the user to go from the current batch-processing method to one-piece processing in work cells.

The hopper is a cylindrical container with a removable top secured with buckles. There are four air inlets in the container floor equally spaced close to the inside wall. These direct air upward and serve to circulate the foam pellets in the container. Mounted in the center of the container floor is a cylinder/piston device which passes through the floor. A thin-walled vertical tube passes through this cylinder and extends into the container to approximately two inches from the cover. Another tube, slightly larger is slipped over the previous one and is attached to the piston inside the bottom cylinder. The outside tube is free to slip over the inner one and is angled at the top. The tube lengths are such that when the outer tube and its attached piston are at the lower end of travel, the tops of both tubes are at the same height.

Three to four hundred foam pellets are placed into the container and the cover is attached. Air entering from the ports in the floor flows out through the center tube. The air stream carries pellets into the center tube where they pass down the tube and stack up for loading into a pellet launcher. Below the container, the tube has ventilation ports in the tube wall all along its length to allow the air to escape.

Other features and advantages of the present invention will be apparent from the following description in which the preferred embodiments have been set forth in conjunction with the accompanying drawings.

### BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and form part of the specification, illustrate an embodiment of the present invention and together with the description, serve to explain the principles of the invention. In the drawings:

Figure 1 shows the invention;

Figure 2 shows a collection chamber; and

Figure 3 shows another detail of the collection chamber.

Additional advantages and novel features of the invention will be set forth in part in the description which follows, and in part will become apparent to those skilled in the art upon examination of the following or may be learned by practice of the invention. The objects and advantages of the invention may be realized and attained by means of the instrumentalities and combinations particularly pointed out in the appended claims.

### DETAILED DESCRIPTION OF THE INVENTION

This invention is comprised of a hopper made of a cylindrical container (1) about 8 inches high with a removable top (2) secured with buckles. There are four air inlets (3) in the container floor (4) equally spaced close to the inside wall. These direct air upward and serve to circulate the foam pellets in the container. Mounted in the center of the container floor is a cylinder/piston device (5, and 6) which passes through the floor. A thin-walled vertical tube (7) passes through this cylinder and extends into the container to approximately two inches from the cover. Another tube (8), slightly larger is slipped over the previous one and is attached to the piston inside the bottom cylinder. The outside tube is free to slip over the inner one and is cut at a 45 degree angle at the top. The tube lengths are such that when the outer tube and its attached piston are at the lower end of travel, the tops of both tubes are at the same height.

The cylinder/piston (5, and 6) device in the floor of the container has several air ports. One of these (9) carries air from the interior of the container (1) to a space below the piston (6). The space above the piston (6) is vented to the outside via several radial ports (10) in the cylinder wall (1). A small port (not shown) at the top of the cylinder also vents to the atmosphere.

In operation, three to four hundred foam pellets are placed into the container (1) and the cover (2) is attached. Air entering from the ports in the floor (4) flows out through the center tube (7). The air stream carries pellets into the center tube (7) where they pass down the tube (7) and stack up for loading into a pellet launcher. Below the container floor (4), the tube (7) has ventilation ports in the tube wall all along its length to allow the air to escape. Pellets passing into the tube will jam at the top opening if they are not oriented properly (Figure 2). When a jam occurs, the tube (7) is partially blocked, causing the pressure to rise in the container. This increase in pressure is communicated to the underside of the piston (6) through one set of ports (9). This causes the piston (6) to rise, lifting the outer tube (8) and righting the jammed pellet. Once air is flowing in the tube again, the outer tube (8) falls to its resting position.

The cylinder/piston (5, and 6) device serves an additional role as a pressure relief valve. If pellets are not used fast enough by the launcher, they stack up in the exit tube (7). Although the tube (7) is vented, eventually the pellets will back up into the region of the tube that is inside the container. When this happens, the tube is again blocked and the piston (6) rises past the radial vent ports and the air escapes.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An apparatus for feeding pellets used in tube cleaning comprising:
  - a cylinder having a floor and a removable top;
  - a first tube along the center axis of said cylinder and exiting through the cylinder floor;
  - a second tube located within said first tube;
  - a cylinder end cap around the circumference of said second tube and engaged with said cylinder floor;
  - a piston encapsulated by said cylinder end cap and engaged with said first tube;
  - and
  - said cylinder floor having multiple air ports around its periphery.

# **ABSTRACT**

A rapid loading hopper for loading foam pellets that is a cylindrical container with a removable top secured with buckles. There are four air inlets in the container floor equally spaced close to the inside wall. These direct air upward and serve to circulate the foam pellets in the container. Mounted in the center of the container floor is a cylinder/piston device that passes through the floor. A double center tube arrangement provides a jam free operation.

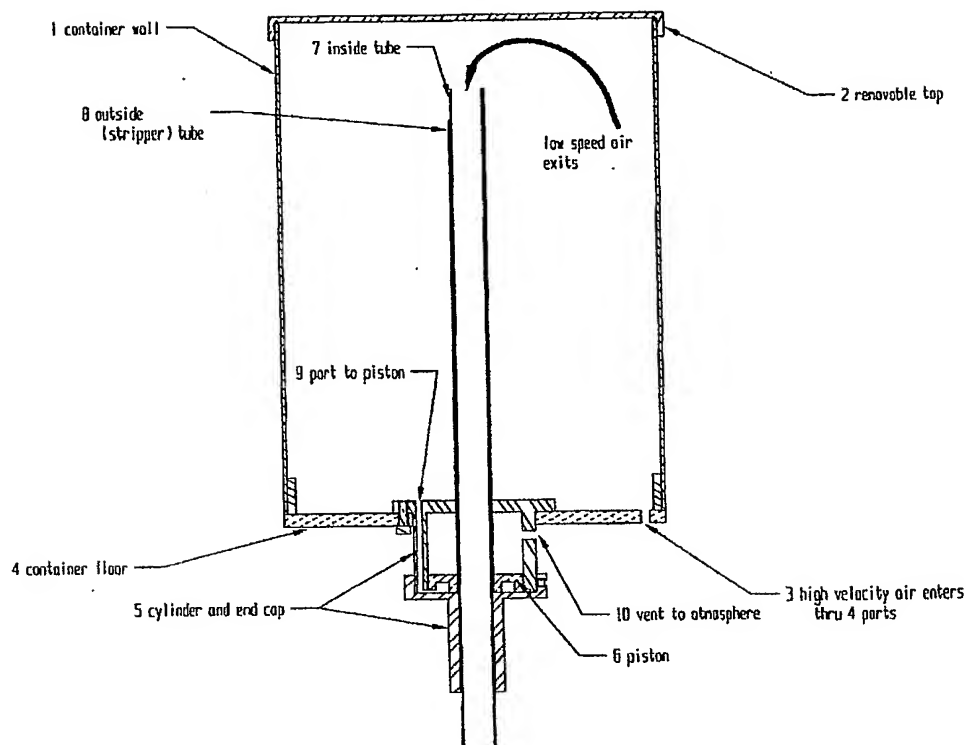
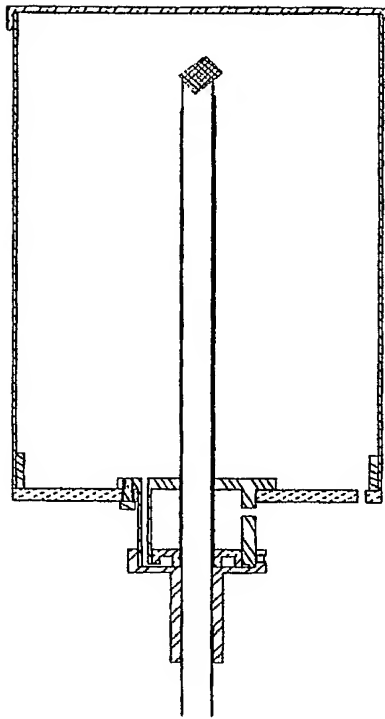


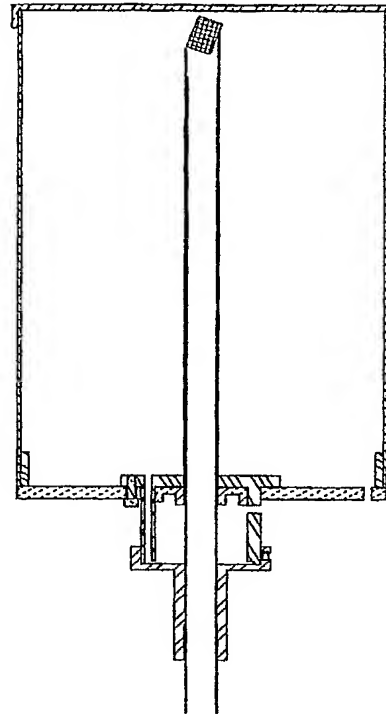
Figure 1





PELLET JAMMED

Figure 2



PELLET RELEASED

Figure 3